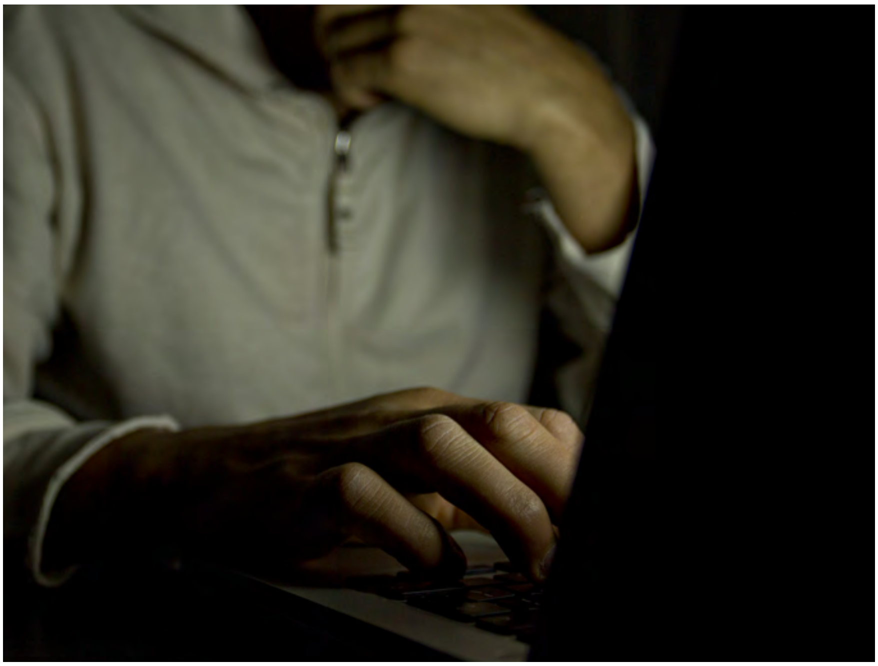
Academic Article

How Relevant is Some Knowledge of Neuroscience for Those Working to Help Sex Addicts Recover?

By Dr. Marion Mensing



Many psychotherapists doubt that effective therapy needs neuroscience, but the damaging impact of early contact to internet pornography on the complex brain system cannot leave us cold

Introduction

It may be helpful to bring to mind, where there has been repeated failure in addressing and changing addictive behaviour, that the brain is not like a computer, that it is not purposely constructed from scratch with one central control unit, but that it has evolved over time – module after module. The central control unit, clients and therapists often are aiming at, does not seem to be in control in the least – if it exists at all. Hence, a better understanding of the human nervous system could be beneficial, also for therapists working to help sex addicts recover.

The first section of this article is an attempt to shine some light on the neuroscience underlying addiction in general. The focus will be on the habitual aspects of addiction, the reward system in the brain, the role of dopamine, the regulating role of the cortex, and the influence of childhood experiences on the capacity of the cortex to regulate. In the second section I will gather up some particularities of the neuroscience underlying sex addiction. A crucial factor is the sexual arousal system in the brain and the strong impact, intense consumption of internet pornography has on sexual functioning in men. Another relevant aspect is the brain development during adolescence and how it is impaired by early contact to pornography leading to quite harmful consequences. The third section elaborates on the relevance of neuroscience for sex addiction therapy and finally, the conclusion will bring all findings to a close.

Neuroscience Underlying Addiction in General

Lewis (2016) puts it very poignantly that the statement 'addiction changes the brain' in itself is rather insignificant because *any* new experience – depending on its novelty, attractivity or enchantment – has the potential to change the brain and with-it – also depending on the frequency of repetition – the potential to condense those changes into a habit. However, what makes addiction different from many other behavioural habits – according to Lewis (2016) – is that it involves thinking and feeling, including the intense feeling of desire that grows into a compulsive focus on one goal superseding all other goals. "It's no accident that addiction and love look pretty much the same in a brain scan" (Lewis, 2016, p.181). Wood (2019) presents a similar view, emphasising that addiction shows relevant characteristics of a habit, whilst acknowledging that addiction and habit require different levels of mental commitment; a pure habit does not require a lot of conscious awareness, as it uses implicit memory whereas addiction also takes over the conscious thinking. Brain scans have shown that with the repetition of certain activities, a shift occurs from the initially activated areas of the *cortex* – the outer layer of the brain which in evolutionary terms is the newest part of the brain – to the activation of inner brain areas more closely connected to the mammalian brain or *limbic system*, i.e., the *striatum* at the base of the fore brain. This shift seems to be associated with less cognitive involvement during habit forming (Patterson and Knowlton, 2018).

According to Woods (2019) habits are (1) context-depended, they need (2) repetition and (3) reward, and the reward needs to be unexpected to stimulate the release of dopamine in the midbrain, which facilitates the transmission of information along certain neural pathways. Dopamine instructs neural areas that are involved in the selection of behaviour to favour a certain action when sensory areas sense the same context again.

Dopamine is released when something pleasurable is anticipated or experienced; it creates desire and is fuelled by endorphins that increase the liking of something by influencing the opiate receptors in the brain, reducing pain and boosting pleasure (Afford, 2020). With each repetition of the pleasurable behaviour, the neural pathways linking the reward networks in the midbrain to the *frontal lobes* – the frontal cortex – become stronger (Lewis, 2013). Over time, neural pathways can become overwhelmed by the high levels of dopamine and the dopamine receptors try to compensate by becoming less sensitive, leading to a need of more and more stimuli to create the same response as before and also making all other things with more modest rewards appear less and less attractive (Afford, 2020). Pleasure cannot be achieved anymore through the behaviour, but withdrawal from it would result in the collapse of dopamine and high levels of stress with high cortisol secretion depleting dopamine even further (Afford, 2020). The striatum, the subcortical region at the base of the forebrain responsible for the control of habits and for impulsive joyful behaviour, cannot function without dopamine; reduced dopamine activity here is associated with depression which seems to be a regular companion of addiction (Korb, 2015).

Flores (2004) sees addicts as rarely being able to develop and maintain healthy relationships or regulate their emotions; for him, addiction is an attachment disorder caused by early attachment issues or childhood trauma. The cortex has also the important role of regulating emotions, impulses and behaviours. In this role, the cortex draws on neural networks shaped by supportive experiences through early attachment relationships that helped to increase successively the tolerance for stress (Cozolino, 2017). If such a support was missing in early childhood the cortex has only limited capacity to regulate. As a way to cope, neural connections consequently emerged within the unconscious memory to distort reality and reduce anxiety and fear differently. These coping strategies easily lead to some kind of addiction or other psychological problems (Cozolino, 2017).

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McGilchrist (2018) detects the regulating capacity of the cortex mainly in the right hemisphere and sees underactivity in the right frontal lobe as symptomatic for addiction. This view is supported by Camprodon, Martínez-Raga et al. (2007) who found that high frequency transcranial magnetic stimulation to the right frontal cortex reduced craving in cocaine addicts.

Hall (2019) mentions three specifics of sex addiction: (1) Access to porn and online sex has become easy, even for young teenagers, (2) sex addiction can be kept as a secret for a long time and (3) sex addiction is the most damaging addiction for relationships.

Particular Aspects of Neuroscience Underlying Sex Addiction

One important aspect of neuroscience underlying sex addiction – in particular porn addiction – is the male sexual response in the brain. The *hypothalamus* in the limbic system plays a crucial role in facilitating erections; it gets its pro-erection information from the reward system in the brain, receiving exciting or inhibiting information from other limbic structures or from the frontal lobes (Park, Wilson et al., 2016). Park, Wilson et al. (2016) suspect internet pornography of having the potential to change these circuits in the brain that rule desire and erection and causing the significant increase in sexual difficulties – i.e., erectile dysfunction, delayed ejaculation, low sexual satisfaction, and reduced libido in partnered sex – especially in young men. The brain is assumed to become hyper-reactive to the excitatory glutamate feed from the limbic system, caused by high-speed sexual streaming videos with endless options of climbing from one novel scene to the next, free and widely accessible on so-called 'tube sites'. The resulting over-consumption likely prompting the brain to downregulate the reward system with the consequence of an increased insensitivity to 'normal' sexual rewards (Park, Wilson et al., 2016).

This problematic development is aggravated, firstly, by the fact that the adolescent brains are much more sensitive to positive rewards of all kinds of stimuli (Doremus-Fitzwater et al., 2010). Secondly, the age of first contact to internet porn significantly dropped. Nearly 50 % of college age men reported in a 2014 study to have been exposed to internet porn *before age 13* versus 14 % in 2008 (Sun, Bridges et al., 2016). The most sensitive time for conditioning sexual arousal is adolescence, and the younger the age of initial

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exposure to particular films the stronger the preference for it over natural partnered sex later in life (Park, Wilson et al. 2016). A younger age of onset in the use of adult pornography also increases the likelihood of a progression to *deviant pornography*, e.g. child pornography (Seigfried-Spellar & Rogers, 2013).

The phases of brain development during childhood and adolescence move from the bottom to the top and from the back to the front; i.e., the brain fully connects the regulating frontal lobes at last (Siegel, 2012). Brain scans reveal that frontal lobe connectivity is delayed until age 20 or older, which means that not every young adult aged 18-24 is already fully capable of seeing the 'bigger picture', especially when attachment and developmental issues also play a role (Jensen & Nutt, 2015; Siegel, 2015). Teenage brains are more formable than adult brains, unfortunately also in a negative way, i.e., by addictions (Jensen & Nutt, 2015). The destructive impact of sex addiction on forming and maintaining significant relationships can lead to isolation and loneliness, thus exacerbating the risks of depression and consequently, there is a higher risk of suicide (Hall, 2019).

Now, I shall expand further on the question whether a knowledge of neuroscience can contribute something to the clinical work with sex addiction, that was not already provided through clinical research and experience in a different way.

How Relevant Is Knowledge About Neuroscience for Those Working to Help Sex Addicts Recover?

A lesson can be drawn from the past, that uncritical embracing of every 'discovery' in neuroscience can lead therapy astray: In the late 1990s neuroscientists came to the conclusion that addiction was indeed a brain disease; brain scans were used to display the addicted brain as evidence for this hypothesis (Satel & Lilienfeld, 2015). This became a dominant view in addiction treatment although an earlier study with Vietnam veterans proved the falsity of this hypothesis: Only 5% of the American soldiers who became addicted to heroin in the Vietnam war relapsed within 10 months after return to the U.S. and 12 % relapsed briefly within three years after return, which shows the importance of context in addiction and disproves the disease concept (Satel & Lilienfeld, 2015; Wood, 2019). Of course, the proponents of the brain-disease paradigm also see its benefit in the public view for dissolving the stigma of a weak character. However, for many clients struggling with addiction, just the message that brains can change is good news and many would prefer now to see addiction as a deeply ingrained habit rather than an illness or a genetical curse (Lewis, 2016).

Basic knowledge about the laterization of the brain could be relevant for therapy in general: The left hemisphere of the cortex is important for focus, logical thinking, language and attention to detail, while the right hemisphere has a more holistic view and is more intuitive, more connected to the mammalian brain, to body sensations, unprocessed emotions and the so-called felt sense of internal awareness in the body (Afford, 2020). McGilchrist (2009) attributes passivity, a certain stickiness, denial, being set in one's ways, a relative inability to support new ways of looking at things to the left hemisphere of the cortex, whereas the right hemisphere would be more associated with independence and motivation. An important implication for therapy would be to engage the right hemisphere and its primary connections to the subcortex and the body, e.g. through paying attention to the bodily feelings and sensations in the present moment. The task of the left hemisphere then is to force aspects of the background or the implicit into consciousness – through the link with the right hemisphere – and bring clarity about them (Afford, 2020). As the neuroscientist Eagleman (2016) puts it, consciousness developed during evolution in the human brain, because it must have had some advantage at some stage. However, he sees consciousness merely as comparable to a newspaper. When the headline is available to read, the activities have already been done and can only be interpreted. Oddly, the interpreter in the brain – as the reader of the newspaper – takes credit for the headline as its own thought and pretends to be the origin of it. Eagleman (2016) does not see a conscious executive control function but rather an interpreter function in the left hemisphere of the cortex.

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This is supported by the experiments of Gazzaniga and Ledoux in 1978 with epilepsy patients who had their two brain-hemispheres disconnected in a surgery. The left hemisphere had command over speech and the right hand, the mute right hemisphere could communicate with the left hand (Eagleman, 2016). A picture of a chicken claw was flashed to the left hemisphere and a picture of a snow shovel to the right hemisphere. Then, when the patient was shown both pictures and asked to point to the picture that was seen before, the right hand pointed to the chicken claw and the left hand to the snow shovel, instantly followed by a verbal explanation quickly made up by the left hemisphere (Gazzaniga, 2012). In another experiment the command 'Walk' was shown only to the right hemisphere and when the person walked and was asked for the reason to walk away, the left hemisphere explained that it wanted to get something to drink (Gazzaniga, 2012).

Eagleman's thesis about the lack of control in the conscious mind would imply that a more systemic approach to the whole inner world would be adequate in therapy. If nothing else, the brain is a complex organic system that has – according to Mitchell (2009) – no central control, but is self-organising, similar to an ant colony where the group as a whole becomes an organism with group intelligence without any commander.

This emphasises the importance of right-hemisphere activation in addiction therapy, as the right hemisphere is more connected to the whole brain-body system. The right hemisphere has a role also in the synchronisation of eye-movements (McGilchrist, 2019) which supports the usefulness of Eye Movement Desensitization and Reprocessing (EMDR) in this context.

Only due to modern brain imaging it is known in what succession different brain regions are connected to one another in childhood and adolescence, and that the frontal lobes are connected at last (Jensen and Nutt, 2015). This has implications for therapy when the group of young clients presenting with porn addiction becomes increasingly significant.

Another important aspect in therapy is the re-sensitisation of the sexual response in the brain after the desensitisation through porn; the technique of mindful masturbation, e.g., could help to create new neural connections in the sexual response/reward system that are more connected to the sense of touch (Hall, 2019).

Even if neuroscience only validates what is already known through clinical research and experience, a validation through a different branch of science is always beneficial and welcome. More importantly, with neuroscience, a *non-pathologizing* way of explaining sex addiction and therapy to clients emerges. Therapy is about understanding and processing the underlying issues by activating the right hemisphere. It is about learning how to break deeply ingrained habits through change of context and building in friction – e.g., porn blockers – but also about developing positive and rewarding habits.

Conclusion

Looking at processes in the brain can provide comprehensible reasoning that addiction may be rather an extreme habit than a disease and how it is often accompanied by depression. Childhood experiences and attachment issues play a role in inadequate neural connections to the cortex, making impulse regulation difficult and manifesting unhelpful coping strategies in the unconscious memory.

The unlimited availability of pornography – sometimes already from a very young age – has extremely damaging impacts, because of the way pornography changes the circuits in the brain ruling arousal and erection. The rapidly decreasing age of onset for first contact with pornography is a reason for concern, also because the brain is formable so precisely in childhood and adolescence. Harmful consequences comprise erectile dysfunction, delayed ejaculation, low sexual satisfaction, reduced libido in partnered sex, higher progression to deviant pornography, difficulties in developing and maintaining relationships, depression and suicide.

In addiction therapy, overreliance on every finding in neuroscience should give way to collaboration and critical dialogue between the two disciplines. Knowledge about the different roles of the right and the left hemisphere of the cortex may provide better understanding of what works in therapy. Neuroimaging brought the learning that adolescent brains are not like adult brains and require different therapeutic approaches – and adolescence can last much longer than age 18. Finding techniques and tools to help re-sensitise the sexual response in the brain by connecting it more to the sense of touch is another implication.

In summary, a knowledge of the neuroscience underlying addiction in general and sexual addiction in particular, is becoming increasingly important for those working to help sex addicts recover – even if it is only a way to explain and validate what is already known in therapy; it can be an explanation that is more acceptable for the client.

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